_____

PROJECT calculates the after-tax net present value of supplemental environmental projects (SEPs), including capital costs, one-time non-depreciable costs, and annual costs. PROJECT requires nine data items to calculate the present value of costs (see Exhibit 1-1 in Chapter 1). You must supply the case name, profit status, filing status, and Variables 2 through 6. For the remaining three variables (marginal tax rate, annual inflation rate, and discount rate), you can either accept the standard values or specify your own values. Standard values for these remaining three variables are contained in PROJECT and should be used for your computation if you do not have reliable data specific to the case. You should change a standard value <u>only</u> if you have information substantiating the change. The after-tax net present value calculation is performed in the same manner whether you use the standard values or specify your own values for variables 7 through 9.

The remainder of this chapter explains each of the variables, in the order in which you enter them in PROJECT. Examples for a hypothetical case accompany the explanation. The examples follow the prompting sequence, item by item, as it appears on your computer screen when you run PROJECT. An example of a prompt and response follows each variable title, in a shaded box. The user's response is shown in **bold** print. The explanations include a brief description of the criteria you should use in developing the first six input values, and the basis for each of the three standard values. Each explanation also contains a statement regarding how a change in the value of each variable will affect the PROJECT after-tax net present value result (e.g., increase it or decrease it). Exhibit 3-1 summarizes these effects by showing the direction of the change in present value caused by a change in each variable, holding all other variables constant.

Exhibit 3-1

**EFFECT OF VARIABLE CHANGES ON
PROJECT CALCULATION
(Holding All Other Variables Constant)**

Input #	Variable Name	Direction of Variable Change	Change in PROJECT Result
1a.	Case name	N.A.	N.A.
1b.	Profit Status	From "Not-For-Profit" to "For-Profit"	Decrease
1c.	Filing Status	From "C-Corporation" to "Other than C-Corporation"	Decrease
2.	Capital Cost Useful Life of Capital Equipment	Increase Increase or Decrease	Increase No Change
3.	One-Time Non-Depreciable Cost Tax Deductible?	Increase From "Yes" to "No"	Increase Increase
4.	Annual Cost # of Credited Years for Annual Costs	Increase Increase	Increase Increase
5.	Penalty Payment Date (PPD)	Later	Increase
6.	Project Operation Date (POD)	Later	Decrease
7.	Marginal Tax Rate	Increase	Decrease
8.	Annual Inflation Rate	Increase	Increase
9.	Discount Rate	Increase or Decrease	Varies[1]

_____

[1] The varying effects of discount rate changes are as follows:

Scenario	Direction of Variable Change	Change in Result

Capital Costs = 0 <u>and/or</u> Not-For-Profit:
    If PPD occurs before POD
    If PPD occurs at the same time as POD
    If PPD occurs after POD
	
	Increase
	Increase or Decrease
	Increase
		
		Decrease
		No Change
		Increase

Capital Costs > 0 <u>and</u> For-Profit:
    If PPD occurs before POD
    If PPD occurs at the same time as POD
    If PPD occurs after POD
	
	Increase
	Increase
	Increase
		
		Varies
		Increase
		Increase

To simplify your data entry, you might find it helpful to use the Data Entry Form presented in Exhibit 3-2. The form provides space for organizing multiple PROJECT runs, thus allowing you to plan in advance which inputs you will want to vary. To facilitate future PROJECT analyses, we suggest that you photocopy this page so that you will have a sufficient supply when the need arises.

Exhibit 3-2

PROJECT DATA ENTRY FORM

INPUT ITEM	RUN #1	RUN #2	RUN #3
1. Case Name			
Profit Status			
Filing Status			
2. Capital Costs			
Dollar-Year			
Useful Life of Capital Equipment			
3. One-Time Non-Depreciable Cost			
Dollar-Year			
Tax-Deductible?			
4. Annual Costs			
Dollar-Year			
Number of Credited Years			
5. Month, Year of Penalty Payment Date			
6. Month, Year of Project Operation Date			
USE STANDARD VALUES? (Yes/No) If No, complete the following:			
7. Marginal Tax Rate			
8. Annual Inflation Rate			
9. Discount Rate			
PROJECT RESULT			

Before you input your data items, PROJECT asks you to enter the current date:

```
ENTER TODAY'S DATE (e.g., OCTOBER 25, 1994)
NOVEMBER 13, 1994
```

This is a label and not part of the actual calculation. It allows you to keep track of when you ran the model. This label is particularly helpful when you have multiple runs for the same case. Thus, any format may be used for the date. For example, PROJECT accepts **7/1/94** just as easily as it does **July 1, 1994**. This date will be printed on each page of the results, for each calculation you make. You enter the date only <u>once</u> each time you use PROJECT, even if you make present value estimates for several scenarios during a single session. If you use the program more than once during the same day, you can add the time of day after the date to differentiate between sessions. Be sure to press the **enter** key after correctly typing your entry.

PROJECT then begins prompting you to enter data specific to the case you are analyzing.

A.   REQUIRED VARIABLES

1.   Case Name, Profit Status, and Filing Status

a.   Case Name

```
1A.      PLEASE ENTER THE CASE NAME:
POLLUTANTS 'R US, INC.
```

After requesting the date, PROJECT asks for the case name. This name can contain up to 40 characters, including spaces, and will appear along with the date on each page of the results. Since its sole purpose is for your own documentation, this label can contain anything you choose. The label can reflect the violator's name, the name of a specific SEP, or a characteristic of the specific PROJECT run (e.g., "Payment in July 1992"). If you are doing multiple runs for the same case, you might find it helpful to vary the case name for each run so that you can more easily distinguish among the various runs. For example, you might title your runs "Pollutants 'R

Us: Contaminant Removal"; "Pollutants 'R Us: Recycling Project"; and so forth. If you enter nothing for the name, nothing will be printed where the label normally appears on your results.

b. Profit Status

```
1B.  PLEASE ENTER THE PROFIT STATUS OF THIS ENTITY:

     1.   FOR-PROFIT (e.g., A BUSINESS)
     2.   NOT-FOR-PROFIT (e.g., A MUNICIPALITY)


     PROFIT STATUS:
1
```

PROJECT then asks you for the profit status of the defendant/respondent. Enter **1** if the defendant/respondent is a for-profit entity or **2** if it is not-for-profit. For-profit organizations can be corporations, partnerships or sole proprietorships. Examples of not-for-profit entities include municipalities, school districts, water/sewer districts, universities, and not-for-profit hospitals. Designating the profit status correctly is critical, because the profit status determines PROJECT's application of the tax rate and the discount rate.

c. **Filing Status**

```
1C.  PLEASE ENTER THE FILING STATUS OF THIS ENTITY.   THIS WILL
     DETERMINE THE ENTITY'S APPROPRIATE TAX RATE:

     1  C-CORPORATION
     2  OTHER THAN C-CORPORATION
     3  SELECT FOR AN EXPLANATION

     [NOTE: NOT ALL ENTITIES THAT HAVE "INCORPORATED" IN THEIR
     TITLES ARE C-CORPORATIONS.]

FILING STATUS:
1
```

If you select **1**, for-profit, to Variable 1B, PROJECT will ask you to enter the filing status of the entity under Variable 1C.[2] If you are uncertain of the entity's filing status, type **3**, and PROJECT will provide the following explanation, and then repeat the data prompt:

```
A C-corporation files a Federal tax Form 1120 or Form 1120-A.  Income
of these companies is taxed at corporate income tax rates.

For-profit entities may also be S-corporations, partnerships, or sole
proprietorships (e.g., a corner grocery store).  These entities file
Federal tax returns other than 1120 or 1120-A, (e.g., an S-corporation
files a Form 1120-S and a Schedule K for each shareholder). The income
and expenses of these organizations are divided among the shareholders
and reported on their individual income tax returns.  Income is
therefore taxed at the individual income tax rate.

If you are uncertain of the filing status of this entity, default to
the C-corporation rate.
```

As noted in the above explanation, a for-profit entity's filing status determines the appropriate tax rate. Later in the data entry process, if you choose the standard value option for Variables 7 through 9, PROJECT

---

[2] Not-for-profit entities are tax-exempt and therefore do not file Federal or State tax returns. Thus, PROJECT skips Variable 1C if you select "not-for-profit" for Variable 1B.

automatically adjusts the tax rate value (Variable 7) to reflect the filing status of the entity. See Section B.1.a. for the effect of filing status upon the PROJECT result.

2. **Capital Costs**

a. **Cost Data**

```
2A.    CAPITAL COSTS FOR SUPPLEMENTAL ENVIRONMENTAL PROJECT =
       (FOLLOW WITH DOL  LAR-YEAR SEPARATED BY A BLANK; e.g., 10000 1993)
       (ENTER 0 IF THIS COST CATEGORY IS NOT APPLICABLE)
10244000 1994
```

The capital costs should include all depreciable investment outlays necessary to implement the SEP. Depreciable capital investments are usually made for buildings, equipment, or other long-lived assets.[3] Typical environmental capital investments include ground-water monitoring wells, stack scrubbers, and wastewater treatment systems. In addition to these conventional capital investments, capital costs may also be associated with projects that do not appear at first to be capital investments. For example, a project to restore a wetland may include capital costs such as pipes and pumps.

Enter the capital costs without commas or dollar signs. The cost should be followed by a blank, and the year in which the dollars are expressed. Express the dollar-year in four digits. If you do not enter a dollar-year the first time through the program, PROJECT assumes that the cost is in project operation date year dollars. If you have capital costs with different dollar-years, you should do separate PROJECT calculations for each.[4] Enter a zero if capital costs will not be incurred.

PROJECT imposes an eight-character limit on the cost amounts it will accept. If your entry exceeds this limit, PROJECT prints an error message and re-prompts you for a correct input:

---

[3] Note that land is not a depreciable capital investment. Land costs should be input as a one-time non-depreciable cost (Variable 3).

[4] You can sum the separate PROJECT calculations to determine total net present value, as long as your penalty payment date (Variable 5) is the same in each run.

```
>>> ERROR: INPUT VALUE EXCEEDS THE 8-DIGIT LIMIT.
    PLEASE REENTER. <<<
```

In the unlikely case that your costs are greater than $99,999,999 dollars, you should give PROJECT all of your costs divided by a factor of 1,000 and rounded to the nearest whole number. You can then multiply the PROJECT result by 1,000 to determine the present value.[5]

Holding all other inputs constant, the present value will be greater for larger capital investment outlays (see Exhibit 3-1).

b.   Capital Equipment Useful Life

```
2B.  WHAT IS THE USEFUL LIFE OF THE CAPITAL EQUIPMENT IN YEARS? (e.g., 15)
15
```

PROJECT next asks for the useful life of the capital equipment. Enter the number of years before the capital investment would have to be replaced. PROJECT will not accept fractional values or a period greater than 50 years.

Unlike BEN's economic benefit calculation, PROJECT's net present value calculation is not directly affected by the useful life of the capital equipment. The useful life has no direct effect because PROJECT calculates the net present value of only a one-time capital expenditure. The cost associated with future replacement cycles of the capital equipment is not included.[6] PROJECT does use the useful life, however, as a supplemental check on whether your answer to the number of credited years for annual costs is appropriate (see Section 4b below).

---

[5] This result will not be exact, but will be sufficiently precise given PROJECT's rounding constraints.

[6] It is possible -- though highly unusual -- for the useful life of the capital equipment to be so short that a replacement cycle will occur within the time period that the defendant is legally required to operate the project. You can calculate the net present value of this replacement cycle with an additional PROJECT run for the capital costs only, with the project operation date equal to the date the replacement cycle will occur.

3. One-Time Non-Depreciable Cost

a. Cost Data

```
3.  ONE-TIME NON-DEPRECIABLE COST =
    (FOLLOW WITH DOLLAR-YEAR SEPARATED BY A BLANK; e.g., 10000 1993)
    (ENTER 0 IF THIS COST CATEGORY IS NOT APPLICABLE)
1000000 1994
```

Enter one-time non-depreciable costs followed by the appropriate dollar-year. Enter a zero if these costs will not be incurred.

Your entry for this variable should include any one-time non-depreciable costs necessary to implement the SEP. Such costs could be for: materials or labor needed to start up the project; for purchasing land; or for engineering, financial or other services that are purchased as part of the project. Examples of one-time non-depreciable costs associated with SEPs include: developing a training program; disposing of hazardous materials; dredging a stream; conducting a pollution prevention assessment; purchasing or restoring a wetland. If such expenses must occur over time and regularly, rather than as a one-time expense, these costs should be input as an annual cost (Variable 4), instead of here. (For example, if the project involves dredging a stream for four years at $100,000 a year, your cost entry would be $100,000 as an annual expense.) As in the case of capital costs, PROJECT will use the project operation date year if you do not provide a dollar-year.

The present value increases as the value for this variable increases because the defendant/respondent will pay a larger amount of money in project costs.

b. Tax-Deductibility

```
    IS THIS ONE-TIME NON-DEPRECIABLE COST TAX-DEDUCTIBLE? (Y/N)
    (NOTE: MOS T ONE-TIME NON-DEPRECIABLE COSTS ARE TAX-DEDUCTIBLE)
Y
```

PROJECT then asks you whether the one-time non-depreciable cost is tax-deductible. (Note that this data prompt will not appear when you are analyzing a not-for-profit entity, since such entities do not pay taxes.) These costs are usually tax-deductible, but in some cases they may not be.[7] Note that, all else being equal, having one-time non-depreciable costs that are <u>not</u> tax-deductible will increase the PROJECT result. (See Exhibit 3-1.)

4.   **Annual Costs**

        a.   **Cost Data**

```
4.  ANNUAL COST =
    (FOLLOW WI TH DOLLAR-YEAR SEPARATED BY A BLANK; e.g., 10000 1993)
    (ENTER 0 IF THIS COST CATEGORY IS NOT APPLICABLE)
    (YOU CAN ENTER A NEGATIVE NUMBER IF THE PROJECT RESULTS IN COST
    SAVINGS, E.G., A MORE EFFICIENT PRODUCTION PROCESS.   SEE USER'S
    MANUAL FOR A MORE DETAILED EXPLANATION.)
25000 1994
```

Annual costs are recurring expenses or cost savings associated with implementation of the SEP. The entry for this variable includes the net change in expenditures (or savings) for labor, power, water, raw materials, supplies, training, waste disposal, recycling, lease payments, and property taxes associated with the annual implementation of the SEP. Annual costs, however, should <u>not</u> include annualized capital recovery, interest payments or depreciation. Enter any annual costs associated with the project, followed by the dollar year. Do not, however, enter any annual costs that appear speculative or indefinite.

For some SEPs, the annual cost may be a negative number to reflect net cost savings associated with implementation of the project. (This is particularly likely for a pollution prevention capital improvement, which may make the production process more efficient, e.g., by reducing electricity consumption and waste generation.)

---

[7] A land purchase is an example of a non-tax-deductible expense. Land is an asset and, therefore, cannot be deducted from taxable income.

PROJECT will calculate the net cost to the company of such a project by evaluating both the capital cost of the new equipment and operational cost savings.

Enter a zero if annual costs will not be incurred. If no dollar-year is entered the first time through the program, PROJECT assumes that the costs are in project operation date year dollars. The same format and eight-character limitation apply to the annual cost as to the other cost inputs. As with the previous two cost categories, the present value of the SEP increases as the value for this variable increases.

b.   **Number of Credited Years**

```
HOW MANY YEARS OF ANNUAL COSTS SHOULD BE CREDITED?
(ENTER THE NUMBER OF YEARS)
(THE NUMBER OF YEARS OF ANNUAL COST MUST CORRESPOND TO THE NUMBER OF
YEARS THAT THE DEFENDANT IS LEGALLY REQUIRED TO OPERATE THE PROJECT.)
5
```

Enter the number of years for which the annual costs should be credited. The number of years of annual costs must correspond to the number of years that the defendant is legally required to operate the project. EPA takes this position because it has no way to be sure the money will ever be spent on the project without such a legal requirement. As a general rule, this input should not exceed five years because it would be impractical in many cases for the government to monitor a consent decree for more than five years. You are allowed to enter a value from six to 10, but you will receive the following warning if you do:

```
Caution:  A value of 6 or higher is generally inappropriate.
See the PROJECT User's Manual for an explanation.
```

PROJECT will not allow you to enter a value that exceeds 10 years. This restriction is based on the expectation that the government cannot continue to monitor whether the defendant is still implementing the project 10 or more years after start-up. Further, in most cases changes in technology, market conditions, and environmental conditions create too much uncertainty to reasonably assume that a project will be implemented

in the same manner for more than 10 years into the future. In many cases these reasons justify limiting the entry for this variable to no more than five years.

In addition, if the annual costs are related solely to the operation and maintenance of capital equipment, then the number of years should not exceed the useful life of the capital equipment. If you enter a number that exceeds the useful life of the capital equipment, PROJECT generates the following message:

```
>>>      YOU HAVE ENTERED A NUMBER OF YEARS FOR THE ANNUAL COST
         CREDIT THAT EXCEEDS THE USEFUL LIFE OF THE CAPITAL EQUIPMENT.

         ALTHOUGH THIS IS ACCEPTABLE, YOU SHOULD VERIFY THAT THE
         ANNUAL COSTS ARE NOT RELATED SOLELY TO THE OPERATION AND
         MAINTENANCE OF THE CAPITAL EQUIPMENT.      <<<
```

This message is only a reminder; PROJECT provides you with an opportunity later in the program to edit your data entries (see Chapter 4).

5.   <u>**Penalty Payment Date**</u>

```
5.   MONTH AND YEAR OF PENALTY PAYMENT DATE (e.g., 4,1994)
1,1994
```

The penalty payment date is the date when the defendant/respondent will make its actual payment to the government. Enter a month and a year, separated by a comma. The month is a number between 1 and 12, and cannot be omitted. The year must contain four digits (e.g., do <u>not</u> shorten the input to read **92** instead of **1992**). PROJECT will not accept years before 1994 or after 2007. PROJECT produces the following error message if the penalty payment year entered is inappropriate:

```
>>> ERROR:  PENALTY PAYMENT YEAR MUST BE BETWEEN 1994 AND 2007. <<<
```

If you vary the date of penalty payment (holding all other variables constant), PROJECT automatically adjusts the present value as of the new penalty payment date, by discounting the costs to the revised date. The present value of project costs will increase as the penalty payment date is pushed further into the future (see Exhibit 3-1).

6.   <u>**Project Operation Date**</u>

```
6.   MONTH AND YEAR OF PROJECT OPERATION DATE (e.g., 8,1994)
7,1994
```

Enter the date when the SEP will commence operation. This is generally the date by which all capital costs and one-time non-depreciable costs will have been expended. For example, a pollution control project that requires the installation of a stack scrubber would not be considered operational at least until all capital costs for the scrubber are expended. The format limitations that apply to the penalty payment date also apply to the project operation date. The project operation date may occur before or after the penalty payment date. In virtually all cases, however, the project operation date will occur <u>after</u> the commencement of the enforcement action.

Holding all other variables constant, the present value of project costs will decrease as the project operation date is pushed further into the future (see Exhibit 3-1).

B.   VARIABLES WITH STANDARD VALUES

PROJECT requires nine user inputs (including the case name, profit status, and filing status) to calculate the after-tax net present value of SEPs. At this point in the program you have already entered six of the inputs. PROJECT offers two options for supplying values for the remaining three variables. You can either use the standard values supplied by the program, or provide your own values for these variables. At this point in the program, PROJECT prints a short message outlining these options. PROJECT then asks you to choose between using standard values and providing your own values:

```
PROJECT will use this information to estimate the after-tax net present
value of the supplemental environmental project as of the project
operation date, and the penalty payment date.  If you select standard
values for the remaining three variables (the marginal tax rate, the
inflation rate, and the discount rate), these standard values will be
printed in your output.  You also have the option of entering your own
values for these remaining three variables.


HOW DO YOU WISH TO TREAT REMAINING VARIABLES?
(1 = USE STANDARD VALUES, 2 = ENTER OWN VALUES)
2
```

If you select the first choice, PROJECT will assign standard values for the marginal tax rate, inflation rate, and the discount rate. You need only to type **1** followed by the **enter** key, and PROJECT will calculate the present value using these standard values.

The standard values in PROJECT will be updated from year to year to reflect changes in tax rates, inflation, interest rates, and so forth, although the assumptions upon which the values are based remain the same. If the case you are analyzing is significantly different from that represented by the standard values, you might

wish to specify values for some of the standard variables. In particularly complicated cases, you might also want to consult a financial analyst or an economist.[8]

The standard variables are numbered 7, 8, and 9. (Recall that variables 1 through 6 are the case name, profit status, and the five inputs discussed in the previous section.) Exhibit 3-3 lists the assumptions that support the standard values.

If you want to enter your own values for Variables 7, 8, and 9, type **2** followed by the **enter** key. PROJECT then prompts you, beginning with Variable 7, for each nonstandard variable value. Note that PROJECT displays the standard value for each of these variables in the format example contained in parentheses in the prompt.

---

[8] In almost all cases, the same tax rates, inflation rate and discount rate should be used in the PROJECT and BEN calculations. Thus, if a defendant convinces you that a lower discount rate is appropriate for the economic benefit calculation in the BEN model, this same discount rate should be used in PROJECT.

Exhibit 3-3

STANDARD VALUE CHARACTERISTICS

Variable	Characteristic Assumed for Standard Value
7. Marginal Tax Rate	The for-profit defendant's highest dollar of income is taxed on the margin at the highest corporate income tax rate (federal and state) for C-corporations, and at the highest individual income tax rate for other for-profit entities. PROJECT assumes that the defendant is located in a state whose marginal corporate income tax rate is equal to the average across all states. The not-for-profit defendant does not pay taxes; therefore its marginal tax rate is zero.
8. Inflation Rate	The rate of increase in project costs is equal to the average annual rate of increase in the <u>Chemical Engineering</u> Plant Cost Index over the most recent ten-year period.
9. Discount Rate	The for-profit defendant's discount rate is based on the weighted-average cost of capital for pollution control investments. The model assumes that pollution control investment is of average risk, and financed by a combination of debt and equity capital. The standard value is equal to the average corporate long-term weighted-average cost of capital over the last ten years. The not-for-profit defendant's discount rate is equal to the average annual cost of debt to municipalities over the last ten years.

1.   **Marginal Tax Rate**

        a.   **For-Profit Entity**

```
7.   MARGINAL TAX RATE (e.g., 39.4) =
41.0
```

        Enter the marginal income tax rate in percentage terms followed by the **enter** key. The program will accept any positive value less than 90 percent, including 0 percent. The standard value for C-corporations (39.4 percent) reflects the highest marginal federal corporate tax rate and the average of the fifty states' highest marginal corporate tax rates. The standard value for other for-profit entities (43.1 percent) reflects the highest marginal federal individual tax rate and the average of the fifty states' highest marginal individual tax rates.

        The marginal income tax rate is the fraction of the last dollar of taxable income that a defendant would pay to federal, state, and local governments. It is the statutory tax rate, and it reflects the amount by which taxes

would increase or decrease if taxable income were to increase or decrease.[9] It is important to use the <u>marginal</u> tax rate, not the <u>average</u> tax rate (i.e., total tax divided by total taxable income), because the marginal tax rate is the rate that applies to <u>incremental</u> changes in the defendant's tax-deductible expenses.

State and local income taxes do not include sales tax, inventory tax, charter tax, or taxes on property. One-time tax payments, such as taxes on the purchase of equipment, should be included in the capital cost or in the one-time non-depreciable cost. If the tax recurs regularly, then it should be included in the annual cost. For example, as mentioned above, sales tax would be included in the capital cost while property tax would be included in the annual cost.

When a state or local income tax exists, the state and local tax rates must be adjusted to reflect the fact that state and local income taxes are deductible expenses in computing federal taxes. The standard values for these variables (a nationwide average of state marginal income tax rates) will produce a reasonable result. The preferable approach, however, is to use state-specific values in place of the standard values in your PROJECT runs. The total corporate marginal tax rates by state are calculated for you in Exhibit 3-4, and the individual marginal tax rates are shown in Exhibit 3-5.[10] The figures in this exhibit represent the federal marginal tax rate on the highest dollar of income and the marginal state rates on the highest dollar of income. Select the value for the state where the defendant is located.

PROJECT uses the marginal tax rate to account for the tax effects of project costs. Because tax-deductible expenses and depreciation associated with capital investments reduce taxable income, they result in

---

[9] Assuming that the defendant/respondent falls into the highest tax bracket.

[10] The adjustment is made by multiplying the state rates by a factor equal to one minus the marginal federal tax rate, as shown in the following formula:

$$MTR_{TOTAL} = MTR_{FEDERAL} + [MTR_{STATE} \times (1 - MTR_{FEDERAL})]$$

where: $MTR_{FEDERAL}$ = the marginal tax rate on the last dollar earned at the federal level; and

MTR_{STATE} = the marginal tax rate at the state level

Therefore, if you were to calculate the total corporate marginal tax rate based on a marginal state tax rate of 10 percent for example, the result would be 41.5 percent:

$$
\begin{aligned}
MTR_{TOTAL} &= .35 + [.10 \times (1 - .35)] \\
&= .35 + (.10 \times .65) \\
&= .35 + .065 \\
&= .415 \\
&= 41.5\%
\end{aligned}
$$

tax savings. A lower marginal tax rate reduces this tax savings, thereby increasing the after-tax cost of the SEP. Thus, a lower tax rate results in a higher present value of project costs (see Exhibit 3-1). Also, changing the defendant's filing status from C-corporation to other for-profit entity increases the standard value tax rate (from 39.4 to 43.1 percent) and thus results in a lower after-tax net present value of project costs.

We assume that the expenses (including depreciation) of SEPs are deductible from a defendant's income for tax purposes. If the Internal Revenue Service concludes that these expenses are not tax-deductible, the tax savings associated with the project costs will be zero, and therefore the appropriate value for the marginal tax rate variable will be zero. Until the proper tax-deductible status is decided, you should assume that such costs are tax-deductible, and apply an appropriate marginal tax rate (i.e., not zero). Note that using a positive tax rate is conservative in that it will produce a lower value for the project than would a zero percent marginal tax rate.[11] If you need further guidance on this issue, please contact Jonathan Libber of the Multimedia Enforcement Division at (202) 564-6011.

---

[11] If the violator asserts that these expenses are not tax deductible and commits in the settlement document not to deduct such expenses, then the marginal tax rate may be set to zero. Further, the violator's chief financial officer, or other official responsible for tax preparation, must submit a signed statement to the Agency certifying that the expenses were not deducted. The certification should state:

> "Under penalties of perjury, I declare that I have examined the tax return(s) pertaining to the year(s) 19_ (through 19_). To the best of my knowledge and belief, these tax returns do not contain deductions or depreciation for any supplemental environmental project expenses my company has incurred."

b. Not-For-Profit Entity

```
7.   THE NOT-FOR-PROFIT ENTITY DOES NOT PAY TAXES;
     THEREFORE, ITS MARGINAL TAX RATE IS ZERO.

     TO CHANGE THIS VALUE, YOU MUST ALSO CHANGE
     THE PROFIT STATUS OF THE DEFENDANT (VARIABLE 1).
```

Not-for-profit entities have a tax-exempt status. When you indicate that the defendant is a not-for-profit entity, PROJECT automatically sets the marginal income tax rate to zero and generates the above prompt. Thus, at a zero marginal tax rate, PROJECT need not estimate the tax consequences of depreciating or expensing project costs.

At this stage of the data entry process, you are not able to change the marginal tax rate from the standard value of zero, since a not-for-profit entity does not pay taxes. PROJECT does provide you with an opportunity to edit your data entries later in the program, however, including the profit status variable (see Chapter 4).

Exhibit 3-4

TOTAL CORPORATE MARGINAL TAX RATES BY STATE
(Percent)

State	Total Tax Rate[12]	State	Total Tax Rate
Alabama	38.3	Montana	39.4
Alaska	41.1	Nebraska	40.1
Arizona	40.9	Nevada	35.0
Arkansas	39.2	New Hampshire	39.6
California	41.0	New Jersey	40.9
Colorado	38.3	New Mexico	39.9
Connecticut	42.5	New York	40.9
Delaware	40.7	North Carolina	40.0
Florida	38.6	North Dakota	41.8
Georgia	38.9	Ohio	40.8
Hawaii	39.2	Oklahoma	38.9
Idaho	40.2	Oregon	39.4
Illinois	39.7	Pennsylvania	42.1
Indiana	40.1	Rhode Island	40.9
Iowa	42.8	South Carolina	38.3
Kansas	37.6	South Dakota	35.0
Kentucky	40.4	Tennessee	38.9
Louisiana	40.2	Texas	35.0
Maine	40.8	Utah	38.3
Maryland	39.6	Vermont	40.4
Massachusetts	41.2	Virginia	38.9
Michigan	35.0	Washington	35.0
Minnesota	41.4	West Virginia	40.9
Mississippi	38.3	Wisconsin	40.1
Missouri	39.1	Wyoming	35.0

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[12] Based on federal marginal corporate income tax rate of 35% and state marginal corporate income tax rates for 1995 provided by the Federation of Tax Administrators (FTA) in Washington, D.C.

Exhibit 3-5

TOTAL INDIVIDUAL MARGINAL TAX RATES BY STATE
(Percent)

State	Total Tax Rate[13]	State	Total Tax Rate
Alabama	42.6	Montana	46.2
Alaska	39.6	Nebraska	43.8
Arizona	43.8	Nevada	39.6
Arkansas	43.8	New Hampshire	39.6
California	46.2	New Jersey	43.6
Colorado	42.6	New Mexico	44.7
Connecticut	42.3	New York	44.4
Delaware	44.3	North Carolina	44.3
Florida	39.6	North Dakota	46.8
Georgia	43.2	Ohio	44.1
Hawaii	45.6	Oklahoma	43.8
Idaho	44.6	Oregon	45.0
Illinois	41.4	Pennsylvania	41.3
Indiana	41.7	Rhode Island	46.2
Iowa	45.6	South Carolina	43.8
Kansas	44.3	South Dakota	39.6
Kentucky	43.2	Tennessee	39.6
Louisiana	43.2	Texas	39.6
Maine	44.7	Utah	43.9
Maryland	42.6	Vermont	45.6
Massachusetts	43.2	Virginia	43.1
Michigan	42.3	Washington	39.6
Minnesota	44.7	West Virginia	43.5
Mississippi	42.6	Wisconsin	43.8
Missouri	43.2	Wyoming	39.6

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[13] Based on federal marginal personal income tax rate of 39.6% and state marginal personal income tax rates for 1995 provided by the Federation of Tax Administrators (FTA) in Washington, D.C.

2. **Inflation Rate**

```
8.   ANNUAL INFLATION RATE (e.g., 1.3) =
3.2
```

Enter the inflation rate as a percent, followed by the **enter** key. Be certain that you enter an annual rate and not a monthly or semiannual rate.

The inflation rate variable in PROJECT is the annual rate at which the costs of environmental control projects have increased, and are expected to increase over time. These cost increases are the result of various factors affecting supply and demand for particular products and services, as well as general inflationary pressures in the economy. PROJECT uses this rate to adjust the cost of SEPs into the project operation year costs. When the inflation rate is higher, the costs increase more quickly over time. An increase in the future costs of the SEP increases its present value.

The inflation rate standard value in PROJECT is an average of inflationary trends over the last ten years, as reported by the "Plant Cost Index" (PCI) published in Chemical Engineering magazine.[14] The Chemical Engineering Plant Cost Index is used rather than another index (e.g., the Consumer Price Index, or the GNP Implicit Price Deflator), because it more accurately reflects the costs of activities associated with pollution-control expenditures. The PCI is based on cost changes in typical components of pollution control, including equipment, construction labor, buildings, and engineering and supervision. Exhibit 3-6 shows the annual Plant Cost Index for 1985 through 1995. Over the ten-year period between 1985 and 1999, inflation related to plant costs averaged 1.6 percent per year.[15] This value is reasonable for most PROJECT calculations. If you have some

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[14] Chemical Engineering, McGraw Hill, Inc., biweekly issues. The Plant Cost Index is normally located on the page labeled "Economic Indicators."

[15] In general, an annual inflation rate is calculated as follows:

$$\left[\left[\frac{Index\ in\ final\ year}{Index\ in\ initial\ year}\right]^{1/N} - 1\right]\ x\ 100$$

Where: N   =   Final year - Initial year

To obtain the standard value, the index values for 1995 and 1985 (381.9 and 325.3, respectively) were used to
(continued...)

reason to believe that a better inflation forecast for your purposes is available, contact EPA headquarters or an economist to discuss the use of a nonstandard input.

15(...continued)
calculate the ten-year average. The calculation is:

$$\left[\left[\frac{381.9}{325.3} \right]^{1/10} - 1 \right] x \ 100$$

$$= \quad (1.01617 - 1) \ x \ 100$$
$$= \quad 1.6 \ \text{percent}$$

Exhibit 3-6

CHEMICAL ENGINEERING PLANT COST INDEX
1985-1995

Year	Index
1985	325.3
1986	318.4
1987	323.8
1988	342.5
1989	355.4
1990	357.6
1991	361.3
1992	358.3
1993	359.2
1994	368.1
1995	381.9

Source: Chemical Engineering, McGraw Hill, Inc., biweekly issues, 1985-1995.

3.   Discount Rate

a.   For-Profit Entity

```
8.   DISCOU NT RATE: WEIGHTED-AVERAGE COST OF CAPITAL (e.g., 10.9) =
10.3
```

Enter the discount rate as a percent followed by the **enter** key. Be certain that the discount rate is greater than the inflation rate. Otherwise, after all entries have been made, PROJECT will flag the error with a message and then re-prompt you for both the inflation and discount rates.

To calculate the present value of SEP costs as of the penalty payment date for all for-profit entities, PROJECT uses the weighted-average cost of capital to discount the relevant cash flows. The weighted-average cost of capital represents the average cost of capital to the defendant, after taxes, assuming constant risk and constant capital structure. In the case of project expenditures, PROJECT assumes that the investment is financed using both debt and equity, in a mix representing the entity's existing mix of debt and equity financing. PROJECT also assumes that the project expenditure is neither safer nor riskier, from an investment perspective, than the average firm's typical investments. PROJECT also uses the weighted-average cost of capital rate to bring the initial present value as of the project operation date either forward or backward to the penalty payment date.

The standard value in PROJECT is based on the weighted-average cost of long-term debt and equity capital over the most recent ten years for a firm of average risk.[16] The calculation of the discount rate is shown in Exhibit 3-7. Discount rate changes have varying effects upon the present value of the SEP, depending upon several conditions (see Exhibit 3-1 and footnote 1).

Defendants may occasionally request an adjustment in the discount rate to reflect their financial condition more precisely. If you want to make any changes to the discount rate, it is strongly recommended that you consult EPA Headquarters or a financial analyst. Should EPA headquarters or your financial analyst agree to employ a more specific discount rate, you must make the defendant aware that a corporate-specific analysis could change the discount rate in a way that would lead to a lower present value for the SEP (see Exhibit 3-1 and footnote 1). Furthermore, any change in the discount rate must also be made to the BEN calculation. A change in the discount rate will impact each model differently. If the rate drops, the economic benefit of noncompliance (from BEN) will be lower, but the present value of the SEP (from PROJECT) will also be lower. While it is difficult to determine the overall impact of the change, consistency is important.

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[16] The weighted-average cost of capital (WACC) is calculated according to the following formula:

$$WACC = \left[[CBA * (1.0 - TR)] * W_D \right] + \left[[TB + R] * W_E \right]$$

where:

CBA	=	Ten-year average return on corporate bonds
TR	=	Marginal corporate tax rate
W_D	=	Fraction of total financing made up of debt
TB	=	Ten-year average return on treasury bonds
R	=	Equity risk premium
W_E	=	Fraction of total financing made up of equity

The calculation of the discount rate is shown in Exhibit 3-7.

Exhibit 3-7

WEIGHTED AVERAGE COST OF CAPITAL CALCULATIONS

YEAR	COST OF DEBT[1]	TAX RATE[2]	AT DEBT COST	FRACTION OF DEBT[3]	TEN YEAR T BOND[4]	RISK PREMIA[5]	EQUITY COST[6]	FRACTION OF EQUITY[3]	WACC
1985	12.05	0.496	6.07	0.50	10.62	7.0	17.62	.50	11.89
1986	9.71	0.496	4.89	0.46	7.67	7.0	14.67	.54	10.18
1987	9.91	0.384	6.10	0.43	8.39	7.0	15.39	.57	11.41
1988	10.18	0.384	6.27	0.52	8.85	7.0	15.85	.48	10.91
1989	9.66	0.384	5.95	0.49	8.49	7.0	15.49	.51	10.82
1990	9.77	0.385	6.01	0.50	8.55	7.0	15.55	.50	10.78
1991	9.23	0.385	5.68	0.49	7.86	7.0	14.86	.51	10.38
1992	8.55	0.386	5.25	0.47	7.01	7.0	14.01	.53	9.89
1993	7.54	0.394	4.57	0.47	5.87	7.0	12.87	.53	8.96
1994	8.26	0.394	5.01	0.46	7.09	7.0	14.09	.54	9.95
10 YEAR AVERAGE	9.49		5.58		8.04		15.04		10.52

[1] This is the average interest rate paid on corporate bonds. Table 1.35, Federal Reserve Bulletin.

[2] For further explanation of how the average total corporate marginal tax rate is calculated, see the BEN User's Manual.

[3] These weights represent the fraction of financing that is made up of debt or equity. The weights are constructed using data from Standard and Poor's Stock Analyst's Handbook. The equity indexes are adjusted to reflect their market value.

[4] Treasury bond data from Table 1.35, Federal Reserve Bulletin.

[5] This is the arithmetic mean of the long-term equity risk premium for 1926 through the most recent year available calculated by Ibbotson Associates.

[6] For further explanation of the calculation of equity cost of capital, see the BEN User's Manual.

b.   Not-For-Profit Entity

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8.   DISCOUNT RATE: COST OF MUNICIPAL BONDS (e.g., 7.4) =
6.5
```

The present value calculations in PROJECT for not-for-profit organizations use the cost of municipal debt as the basis for the discount rate. When you indicate that the defendant is a not-for-profit entity, PROJECT automatically defines the discount rate based on average municipal bond yields as reported by Moody's over the last ten years.

If you want to modify this standard value, you should enter the cost of debt most applicable to the defendant. The municipal bond yield can be estimated by the interest rates for the most recent municipal bond issuance. Alternatively, you can use the reported yield on municipal debt having the quality rating assigned to the defendant's bonds, or when the rating is not known, the reported average municipal bond yield.

Municipal bond yields are reported monthly in Moody's Municipal and Government Manual for specific municipalities and as averages for each bond quality rating. Bonds are rated by Moody's according to their riskiness, the higher quality ratings denoting lower risk bonds. The ratings range from "Aaa", the highest quality, to a low of "C". Average bond yields are reported for only the highest four ratings: "Aaa," Aa," A," and "Baa". The municipal bond yields over the past twenty-two years are shown in Exhibit 3-8.

The standard value for the cost of municipal debt is based on the average municipal bond yield (for Aaa, Aa, A, and Baa) from 1986 to 1995, and is equal to 6.71 percent.

Exhibit 3-8

MUNICIPAL BOND YIELD AVERAGES
1974-1995

	Average	Aaa	Aa	A	Baa
1974	6.19	5.89	6.04	6.27	6.53
1975	7.05	6.42	6.77	7.37	7.62
1976	6.61	5.65	6.12	7.17	7.49
1977	5.64	5.20	5.39	5.86	6.12
1978	5.86	5.51	5.68	5.99	6.27
1979	6.28	5.89	6.11	6.34	6.76
1980	8.34	7.85	8.06	8.44	9.01
1981	11.10	10.42	10.89	11.31	11.75
1982	11.63	10.88	11.30	11.84	12.48
1983	9.45	8.80	9.20	9.64	10.17
1984	10.00	9.61	9.88	10.15	10.37
1985	9.08	8.60	8.93	9.20	9.59
1986	7.33	6.95	7.16	7.42	7.75
1987	7.59	7.12	7.39	7.76	8.20
1988	7.57	7.36	7.49	7.59	7.84
1989	7.18	7.00	7.10	7.22	7.40
1990	7.12	6.96	7.06	7.15	7.29
1991	6.78	6.56	6.69	6.84	6.99
1992	6.27	6.07	6.20	6.34	6.46
1993	5.59	5.38	5.50	5.65	6.08
1994	5.96	5.77	5.93	6.02	6.09
1995	5.89	5.77	5.80	5.91	6.09

Source: Moody's Municipal and Government Manual